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(21)Application number : 07-283483 (71)Applicant : SONY CORP

(22)Date of filing : 31.10.1995 (72)Inventor : AMANO KEI

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(54) AV SYSTEM PROVIDED WITH PLURAL VIDEO EQUIPMENTS

(57)Abstract:

PROBLEM TO BE SOLVED: To provide the AV system configured through the connection of at least two video equipments or over in which a video image sent from each video equipment is displayed on a screen of a television receiver regardless of the characteristic of each video equipment.

SOLUTION: At least two video equipments or over such as digital VCRs are in daisy connection to a television receiver via a digital interface in compliance with the IEEE1394 standards. Then a function not provided to each digital VCR such as a tuner provided only to one VCR is used to display the image on the screen as if they were all provided with the function.

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## CLAIMS

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### [Claim(s)]

[Claim 1] AV system equipped with two or more visual equipments characterized by being a television receiver linked to at least two or more sets of two or more visual equipments, having displayed two or more images sent from said two or more visual equipments on the screen of said television receiver, and establishing a means to choose suitably.

[Claim 2] Said means to choose is AV system equipped with two or more visual equipments according to claim 1 characterized by choosing suitably two or more images sent from said two or more visual equipments, and displaying the this chosen image on a child screen using remote control.

[Claim 3] AV system which is the television receiver connected to at least two or more sets of two or more visual equipments through the digital interface, and was equipped with two or more visual equipments characterized by establishing a means to display two or more images sent from said two or more visual

equipments on the screen of said television receiver, and to choose them suitably.

[Claim 4] Said digital interface is AV system equipped with two or more visual equipments according to claim 3 characterized by connecting two or more AV equipments to a daisy chain, and giving the equal transmitter meeting by the two-way communication of a packet method based on IEEE1394 specification.

[Claim 5] Said means to choose is AV system equipped with two or more visual equipments according to claim 3 characterized by displaying the image sent from the visual equipment which chose the icon which shows said two or more visual equipments using remote control, and was chosen from this icon on a child screen.

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## DETAILED DESCRIPTION

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[Detailed Description of the Invention]

[0001]

[Field of the Invention] AV system equipped with two or more visual equipments concerning this invention connects two or more digital one VCR to a television receiver using the digital interface based on IEEE1394 specification in which bidirectional serial communication is possible in more detail about two or more visual equipments, for example, the television receiver connected with digital one VCR, and is related with AV system which enabled it to choose suitably the image which sends from each digital one VCR regardless of the individuality of each proper digital [ VCR ] on the screen of a television receiver.

[0002]

[Description of the Prior Art] In case an AV equipment called a visual equipment, for example, a video tape recorder and audio equipment, is connected to graphic display machines, such as a television receiver in the conventional technique, the image of each AV equipment is chosen and it admires on the screen of a television receiver, whenever it pushes the carbon button of the input change on the remote control which is mainly attached to the television receiver, the image displayed on the screen of a television receiver like "video 1" and "video 2" changes, and an image can be enjoyed.

[0003] Moreover, after changing, by OSD (On Screen Display) display, fixed time amount indicates whether the present image is a thing from the input terminal of a television television throat on board, and can check it.

[0004] Furthermore, as it has realized by PinP (Picture in Picture), when the television receiver has the function of a child screen, it can check whether it is the image sent from which visual equipment by changing the image input of a child screen with remote control, looking at the image of a parent screen.

[0005] Moreover, when the screen size of a television receiver is the wide screen of 16:9, the approach of dividing a screen into one half and displaying two

images, respectively is also realized.

[0006] In the present condition, the signal line to which it comes from each AV equipment has analog signals in use, such as a video signal of a composite, a switch terminal signal, and an audio stereo terminal.

[0007] These are seeing the image copied out on a screen, carrying out recognition which says by the change of an image with remote control, "The 1st video tape recorder is this video outlet", when the user recognizes the connection condition of the so-called present condition of having connected physically the video input terminal and video outlet terminal of a television receiver.

[0008]

[Problem(s) to be Solved by the Invention] However, in the above-mentioned conventional AV system, direct continuation of the signal of all AV equipments is carried out to the television receiver, or it must be connected to a television receiver through AV switcher. Since the transfer approach of an image is an analog signal, this has been produced by limit that direct continuation of the physical signal itself must be carried out to a television machine.

[0009] If the number of AV equipments increases, since it will become difficult to

recognize which AV equipment is really connected with which input terminal of a television receiver here, there is a trouble that the signal of the "video 1" with remote control, "video 2", etc., etc. is referred to as becoming still more complicated if which signal deals with which source cannot grasp in change actuation but AV switcher goes into this further.

[0010] Therefore, in AV system which connected two or more AV equipments, it has the technical problem to AV system which recognizes the image which sends from two or more of the visual equipments on a parent screen television television on a plane, a child screen, etc., and can choose it suitably, without adhering to the visual equipment of a proper, when two or more visual equipments are connected especially.

[0011]

[Means for Solving the Problem] AV system equipped with two or more visual equipments concerning this invention in order to solve the above-mentioned technical problem is the television receiver which connected at least two or more sets of two or more visual equipments through the digital interface based on for example, IEEE1394 specification, displays the image of a visual equipment on the screen of a television receiver, and makes it the configuration which

established a means to choose suitably. And this selection means is choosing suitably two or more images which send from two or more visual equipments using remote control, and having displayed this selected image on the child screen.

[0012] Without [ without it takes into consideration two or more visual equipments, for example a connection condition digital / VCR /, by having considered as such a configuration, and ] paying one's attention to individuality digital [ each / VCR ], the image which sends from a visual equipment on the screen of a television receiver can be displayed on a screen, and can be chosen suitably.

[0013]

[Embodiment of the Invention] The gestalt of desirable operation of AV system equipped with two or more visual equipments concerning this invention has the composition of having connected the AV equipment of variety a large number through the digital interface (henceforth 1394IF) based on IEEE1394 specification, as shown in drawing 1 .

[0014] 1394IF is explained here. 1394IF is the so-called serial buses which can connect two or more AV equipments by DIJI chain connection, and each AV

equipment forms the node in 1394IF. A branch can also be taken out from each node. Connection of each AV equipment is arbitration unless a loop formation is formed.

[0015] In drawing 1, two branches have come out from television receiver TV, and one of them is connected with a digital camera DCAM. Namely, to another branch Digital VCR-A, digital VCR-B, and digital VCR-C, A digital video disc DVD, game machine G, and Telephone TEL Facsimile FAX, the music disk-swapping machine MDC, a digital audio tape recorder DAT and the compact disk exchange CDC, Printer P, and infrared equipment IRU are connected to the daisy chain by the P1394 cable.

[0016] 1394IF which has such a function consists of the same connector connected with the P1394 cable of the 6 heart to the both ends of a cable, the LSI-ized physical layer which was connected to each connector, an LSI-ized link layer which was connected with the physical layer, and a transaction layer connected with the link layer. A transaction layer consists of firmware.

[0017] A P1394 cable consists of two pairs of shielding wire, and two power-source lines. Two of pairs [ them ] are with the data line and a strobe line, they are used for data transfer, and are used as other power-source lines.

Therefore, since the device on which the power source has fallen can also make a signal bypass, it can send a signal to a previous device from the device on which the power source has fallen.

[0018] The transceiver is built in the connector and the repeater is formed by this transceiver and the P1394 cable. The end of the physical layer is connected with a P1394 cable, and the other end is connected with the link layer. The physical layer decrypts the code data received from the link layer to an electrical signal, and sends them out to a P1394 cable while it encodes the electrical signal inputted from the P1394 cable and sends it to a link layer. The physical layer performs the below-mentioned bus arbitration etc. again.

[0019] A link layer decodes the packet received from the transaction layer while creating a packet based on the data encoded by the physical layer and transmitting to a transaction layer. Moreover, a link layer controls the transfer cycle of a packet.

[0020] 1394IF constituted as mentioned above has the following description.

(1) Since the connection between AV equipments is serial, it can communicate with other AV equipments without all AV equipments' needing a switch connection like AV switcher prepared in the above-mentioned conventional

television receiver TV.

(2) The AV equipment in AV system is not fixed, but it can equip or secede from it freely in the location of the arbitration in AV system by carrying out the insert and remove of the connector. At this time, it resets ID of each AV equipment automatically.

[0021] (3) It has a bus arbitration (mediation) function for a specific AV equipment not to monopolize a serial bus. This transmits data per packet and the packet size is restricted to a maximum of 512 bytes (in the case of a 100M bit per second transfer rate, it is equivalent to about 40 microseconds). As for each AV equipment, only each allocation time amount performs packet transmission in order of the node number specified.

[0022] (4) A packet is an always fixed time interval, and it has come to be unable to perform a transfer of other packets until it is sent out from a link layer and the transfer is completed. Each AV equipment will judge whether it is data required for itself, if a packet is received, and it processes or disregards it based on the decision result.

[0023] (5) There are an ordinary packet, an urgent packet with a high priority, and the below-mentioned isochronous packet with a still higher priority in a

packet.

(6) A P1394 cable is thin, and since the connector is small, leading about of a P1394 cable and attachment and detachment of a connector are easy for it. Moreover, cost is cheap.

[0024] (7) The transfer rate of a signal is quick as compared with the conventional serial transmission. This is because a signal is read with DS link method which follows delivery and the regulation of "reading the data of the data line when one of the potentials of the data line or a strobe line change" by serial transmission (transfer per bit) using one pair of data lines, and one pair of strobe lines. This DS link method corresponds to the time shake of the potential of the data line. It becomes unnecessary to insert the conventional start bit and conventional stop bit like serial transmission (for example, RS232C) at intervals of 8 bits by this, and a transfer rate improves.

[0025] Next, the control center CC side of a television receiver is explained to the Lord of AV system equipped with two or more visual equipments connected with the digital interface based on IEEE1394 specification.

[0026] in addition, it comes out not to mention all based on this specification being contained, without being limited to this, although explained on the basis of

IEEE1394 specification in the gestalt of this operation.

[0027] AV system equipped with two or more visual equipments is constituted by a control center CC, a P1394 cable, and two or more AV equipments (for example, digital VCR) as shown in drawing 2.

[0028] The control center CC consists of a TV circuit 1, a control circuit 11, and a P1394 interface 23.

[0029] The TV circuit 1 has the video-signal processor and the sound signal processor like the usual TV circuit. A video-signal processor The image decoder 2 which decodes the digital video signal inputted from the P1394 interface, D/A converter 3 which changes into an analog signal the video signal decoded by the image decoder 2, The image multiplexing processing section 4 equipped with GUI (graphic user interface) which superimposes the analog video signal changed with D/A converter 3, the message signal from a display controller mentioned later (superimposition), It consists of the display process section 5 which reorganizes to a display the image data processed in the image multiplexing processing section 4, and a receiving set 6 which displays the output of the display process section 5 on the Braun tube.

[0030] Moreover, the sound signal processor of the TV circuit 1 consists of the

voice decoder 7 which decodes the digital sound signal inputted from the P1394 interface 23, D/A converter 8 which changes into an analog signal the sound signal decoded by the voice decoder 7, sound signal amplifier 9 which amplifies the analog sound signal changed with D/A converter 8, and a loudspeaker 10 which changes into a sound the sound signal amplified with the sound signal amplifier 9.

[0031] The bus 13 to which a control circuit 11 connects between CPU12, CPU12, and the P1394 interfaces 23, The I/O circuit 14 which intervenes between the image decoder 2 and the voice decoder 7, and a bus 13, The display controller 15 and VRAM16 which intervene between a bus 13 and the image multiplexing processing section 4, The nonvolatile RAM 17 connected to the bus 13, respectively, and the timer 18 connected through the I/O circuit 24, ROM19 and the remote control signal decoder 20 which receives and decodes the data from a remote control signal and a bus 13, It consists of an I/O circuit 21 which transmits and receives the data on a bus 13 to this remote control signal decoder 20, and portable remote control 22 which transmits a remote control signal.

[0032] CPU12 performs the program mentioned later. A bus 13 is the usual CPU

bus. The I/O circuit 14 controls the timing of input and output of the image decoder 2 and the voice decoder 7 by the bottom of control of CPU12.

[0033] A display controller 15 creates the message data for one screen of a receiving set 6 etc. on VRAM16 under control of CPU12, and sends this to the image multiplexing processing section 4.

[0034] Nonvolatile RAM 17 has memorized the information about the hysteresis of the AV equipment configuration connected to the P1394 interface 23. A timer 18 consists of a counter and carries out counting of the real time. ROM19 is read-only memory which stores a program.

[0035] The P1394 interface 23 has the connector socket connected to the circuit LSI-ized by IEEE1394 bus specification and this circuit. The plug of a P1394 cable is inserted in this connector socket. The function of this P1394 interface 23 is carried also in the AV equipment side connected.

[0036] A P1394 cable is a cable which consists of six core wires, and is making sequential connection of ... at series between a control center CC and the video A which is digital [ VCR ], and between Video C and the AV equipment which is not illustrated. Sequential connection of the P1394 cable is made so that a loop formation may not be made, as mentioned above. In addition, in drawing 2 , in

order to explain the summary of this invention, the connection condition with three videos A which are digital [ VCR ], videos B, and videos C is shown among two or more visual equipments. The inner video C is equipped with the tuner, and an antenna can be connected now.

[0037] As already stated as a description of IEEE1394 specification, in this P1394 interface 23, it detects the AV equipment newly having been connected or having been removed by the P1394 cable connected to the socket, and has in it the function to tell CPU12 about that.

[0038] That is, the P1394 interface 23 sends the signal (henceforth a connection signal) which shows that to CPU12, when an AV equipment is newly connected or removed.

[0039] CPU12 has the function to perform change of an AV equipment configuration, a display, the automatic setting of a tuner and the display that are the setup 18 of the newly connected AV equipment, for example, a timer, and a channel selection means, the display of the removed AV equipment, etc., by making the above-mentioned connection signal into a trigger.

[0040] two or more image data and voice data from digital one VCR (for example, Video A, Video B, video (C)) which are connected to the television receiver side

which consists of such a configuration outside through the P1394 cable -- a digital signal -- a packet -- it is-izing and transmitted.

[0041] Here, since it mentioned above about packet-ization of voice data in the image data list, it omits. In the image decoder 2 which incorporates image data, in the packet-sized animation of two or more channels, it has the function which can be decoded to coincidence, and the image data of a parent screen and a child screen are generated.

[0042] This image decoder 2 is controlled from CPU12 through the I/O circuit 14, and can choose whether it chooses which image channel on the bus 13 of the P1394 interface 23 it is, and decodes. Moreover, the display position of selection of which channel to display on a parent screen or a child screen, the size of a child screen, and the child screen on a parent screen is also controlled.

[0043] The number of the images which can be decoded to coincidence here is not especially restricted, although limited to two for the purpose of displaying a parent screen and a child screen.

[0044] Moreover, in the voice decoder 7, it has the function in which the voice corresponding to a specific image channel shall be decoded, and the voice of a parent screen is decoded. This has the image transmitted from the P1394

interface 23, and the function which chooses an audio specific channel.

[0045] The data of an image and voice are changed into an analog signal with D/A converters 3 and 8, respectively, an analog sound signal is outputted to a loudspeaker 10 through the sound signal amplifier 9, and an analog video signal is outputted to the screen of a receiving set 6 by the display-processing section 5.

[0046] Graphical data, such as an icon display of the AV equipment it is displayed on the screen of a television receiver that mentioned above on the other hand, shall be stored in ROM19, and this data is written in VRAM16 through a bus 13. The VRAM address which is a display position at the time of being written in is controlled by CPU12 through a bus 13. When processing of a superimposition etc. is performed by the image multiplexing processing section 4, image data and graphical data are multiplexed and it is displayed on a receiving set 6 by the display controller 15 here.

[0047] On the other hand, the signal with remote control 22 is processed by the remote control signal decoder 20, and is analyzed by CPU12 as a remote control code through the I/O circuit 21 for whether it is that which carbon button on remote control 22 was pushed. A timer 18 is used in order to process interruption of fixed time amount etc., and it is controlled by CPU12 through the I/O circuit 24.

[0048] AV system which equipped with at least two or more sets of visual equipments the television receiver possessing the control center CC which consists of such a configuration As shown in drawing 3 , for example, at least two or more sets of a television receiver and two or more visual equipments, For example, when digital one VCR (Video A, Video B, video C) is connected through a P1394 cable, without being caught by individuality digital [ each / VCR ], the icon on the screen of a television receiver etc. can be operated and a favorite image can be displayed. It explains in full detail below.

[0049] That is, through the P1394 cable, three digital one VCR are connected with Video A, Video B, and Video C, respectively, and it has composition which draws the image which sends from digital one VCR of these in a television receiver two or more visual equipments and here.

[0050] It connects with connection methods, such as SCSI, with the similar daisy chain between a television receiver, Video A, Video B, and Video C. However, the terminator attached to cable both termination like SCSI is unnecessary, and serves as a specification based on said IEEE1394 specification explained in full detail in this example.

[0051] the capacity which a function digital [ VCR ] packet-izes the digital image

data which are a record medium, and which are recorded, for example on the magnetic tape, and is transmitted on the bus 13 of the P1394 interface 23 -- a packet -- it has the capacity which decodes the image data on the bus 13-izing [ the bus ] and sent, and is recorded on the magnetic tape which is a record medium.

[0052] Moreover, a certain channel shall be assigned to digital one VCR. For example, Video A should assign "a channel 10" and Video B like "the channel 20", and only video C shall have equipped the tuner which receives an electric wave etc. If it does so, the video output chosen by the tuner of Video C will be encoded to digital image data, or packet-ization of digital image data will be performed, and it will transmit on the bus 13 of the P1394 interface 23. If Video A incorporates, as the data with which it was packet-ized on the bus 13, for example, the image data of "a channel 10", sent the image of the "channel 10" from Video C by Video A, they can send it to a television receiver.

[0053] Thus, the image data of a specific channel can be obtained from the video C with the function of a tuner through the P1394 interface 23 irrespective of not having the function of a tuner in Video A and Video B. Without a \*\*\*\*\* user involving the screen of a television receiver in any way, this is visible as if it

equipped each video A and Video B with the tuner function.

[0054] On the other hand, actuation on a screen will be performed by [ as displaying the image corresponding to the icon on a child screen ], if a user moves the pointing cursor on the screen of a television receiver using remote control and cursor moves onto an icon. About such actuation and actuation, the flow chart shown in drawing 5 , drawing 3 , and drawing 4 are made reference, and are explained.

[0055] The display on the screen of a television receiver has become like drawing 4 (A), and it is assumed that the image to Video B is dubbed from Video A. From Video C, the image acquired from the tuner is outputted to the parent screen 25. It explains here according to the flow chart of drawing 5 .

[0056] (1) Decode the signal from remote control 22, and wait until the code corresponding to a cursor carbon button appears (steps ST1 and ST2). Here, the idle time of CPU12 in the meantime is performing another processing only by carrying out a code check at fixed spacing.

[0057] (2) If the code corresponding to the cursor carbon button of remote control 22 appears, x after migration and a y-coordinate will be calculated by making it correspond with x on the virtual screen 26 of former cursor, a

y-coordinate (to refer to drawing 4 (B)), and the pushed carbon button (steps ST3 and ST4).

[0058] (3) Perform a cursor display through VRAM16 based on x after migration, and a y-coordinate.

(4) If cursor 28 goes into the rectangle field on the virtual screen 26 of the icon 27 which is indicating by the tubular surface (x1, y1), as shown in drawing 4 (C), the channel of the video A of the icon 27 corresponding to that field (or Video B, video (C)) will be chosen, and it will be ordered decoding of this channel, and will display on the child screen 29 (refer to drawing 4 (x2, y2) (B)). If it does so, the image of the channel (an example "channel 10") chosen by the video A chosen, for example will be displayed on the child screen 29 (steps ST5 and ST6).

[0059] (5) Although the coordinate of the cursor 28 after migration went into the rectangle field (x1, y1) of an icon 27, and (x2, y2), when it is in the rectangle field of the icon 27 which is a former coordinate, turn off the child screen 29 and end decoding of the image which was being taken out before (steps ST7 and ST8).

[0060] Thus, the icon 27 on a tubular surface and the behavior of cursor 28 perform the change of child screen 29 display, and ON/OFF of a display. When the output of the image over an icon 27 does not exist here, even if it moves

cursor 28 onto an icon 27, nothing is displayed on the child screen 29. Under the present circumstances, in order to show that it is a non-signal, it is also possible to display the blue back's etc. image.

[0061] Moreover, as a means to perform the change of the parent screen 25 and the child screen 29, in case cursor 28 is shown in the child screen 29, it is also possible by pushing a thing like the decision carbon button on remote control to change a screen.

[0062]

[Effect of the Invention] There is effectiveness referred to as that AV system equipped with two or more visual equipments concerning this invention can choose on a screen the image which sends from the visual equipment corresponding to an icon, without only moving cursor onto the icon currently displayed on the screen using remote control in two or more visual equipments connected to the television receiver through P1394IF, and being caught by the visual equipment of a proper as explained above.

[0063] Moreover, correspondence with an actual device is visually attained by replacing the visual equipment for actuation by the icon.

[0064] Furthermore, there is effectiveness which says that actuation of the

image selection corresponding to two or more visual equipments connected by digital bus is realizable.

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#### DESCRIPTION OF DRAWINGS

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[Brief Description of the Drawings]

[Drawing 1] It is the explanatory view showing connection between each AV equipment in AV system equipped with two or more visual equipments concerning this invention, and a digital interface.

[Drawing 2] It is the block diagram showing the circuitry by the side of this television receiver.

[Drawing 3] It is the explanatory view having shown connection this television receiver and digital [ two or more / VCR ].

[Drawing 4] It is the explanatory view which displayed the condition of the image included in two or more digital one VCR which appeared on this screen.

[Drawing 5] It is the flow chart which showed the actuation digital [ VCR ] displayed on this screen.

#### [Description of Notations]

1 TV Circuit

2 Image Decoder

3 D/A Converter

4 Image Multiprocessing Section

5 Display-Processing Section

6 Receiving Set

7 Voice Decoder

8 D/A Converter

9 Sound Signal Amplifier

10 Loudspeaker

11 Control Circuit

12 CPU

13 Bus

14 I/O Circuit

15 Display Controller

16 VRAM

17 RAM

18 Timer

19 ROM

20 Remote Control Signal Decoder

21 I/O Circuit

22 Remote Control

23 P1394 Interface

24 I/O Circuit

25 Parent Screen

26 Virtual Screen

27 Icon

28 Cursor

29 Child Screen

VCR-A, VCR-B, VCR-C Digital VCR

TV Television receiver

VTR Video tape recorder

DCAM Digital camera

DVD Digital video disc

G Game machine

TEL Telephone

FAX Facsimile

MDC Music disk-swapping machine

DAT Digital audio tape recorder

CDC Compact disk exchange

P Printer

IRU Infrared equipment



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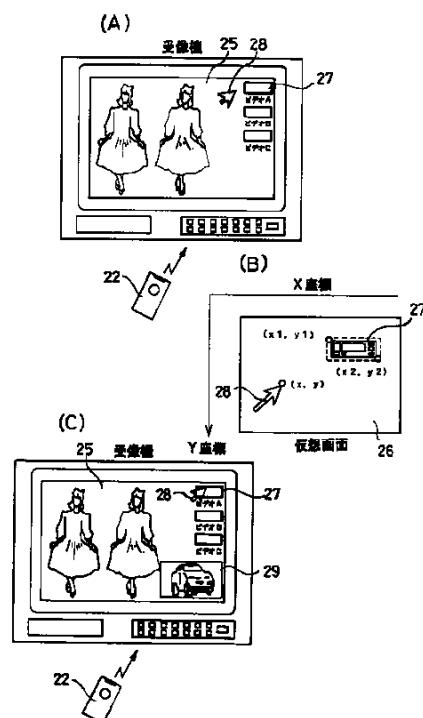
(71)出願人 000002185

ソニー株式会社  
東京都品川区北品川6丁目7番35号

(72)発明者 天野 圭  
東京都品川区北品川6丁目7番35号 ソニ

(74)代理人 弁理士 佐々木 功 (外1名)

(54) 【発明の名称】 複数の映像機器を備えたAVシステム



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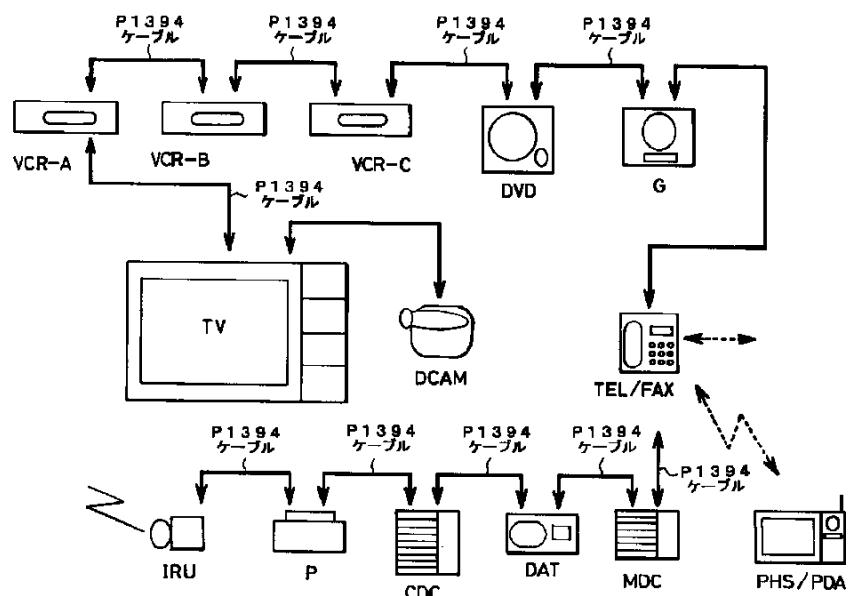


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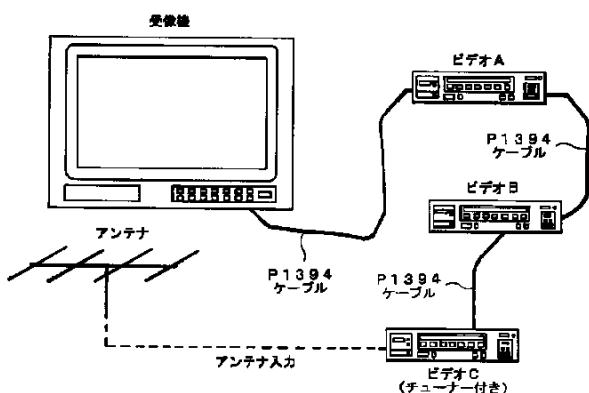
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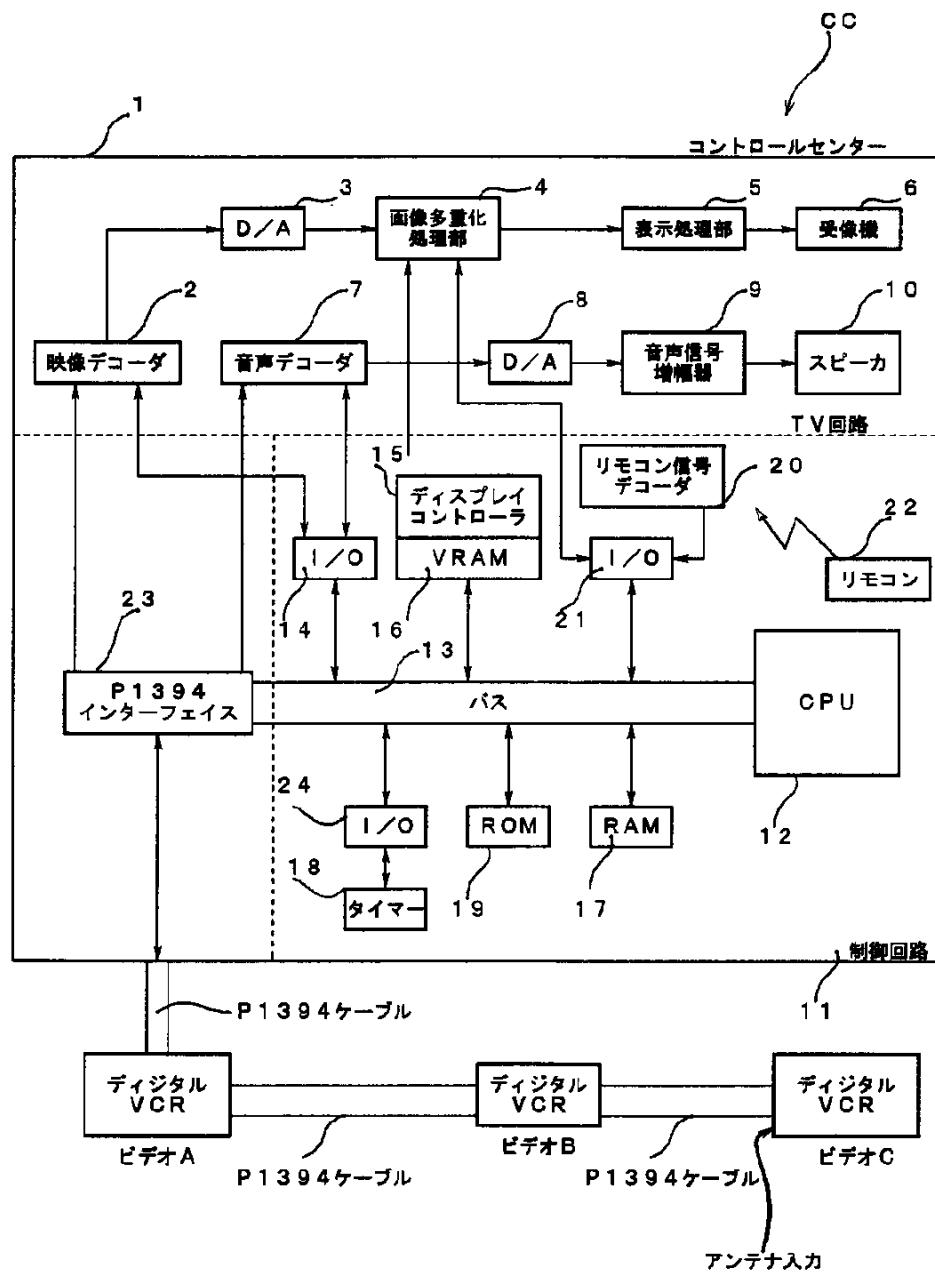
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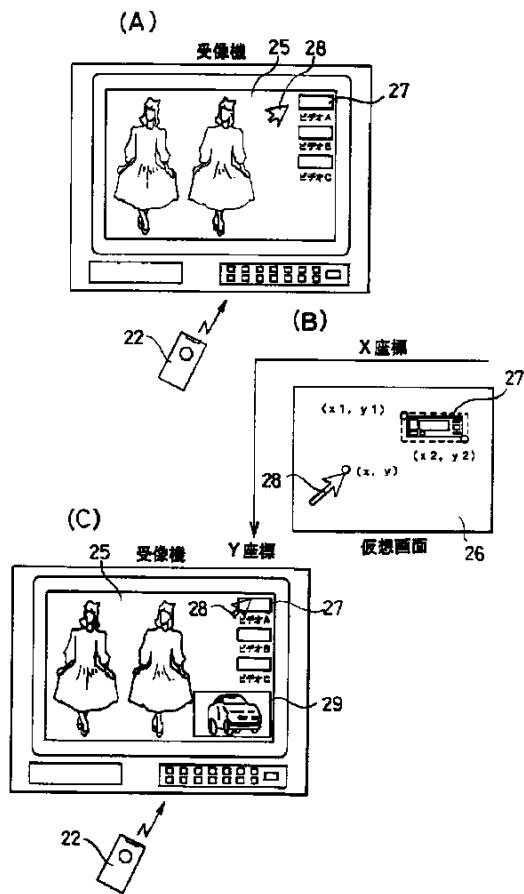
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